

REMARKS

Responsive to the Office Action dated August 19, 2003, Applicants submit the present amendment and remarks, and respectfully request reconsideration and allowance of the remaining claims. Claims 21 and 31 have been amended herein and no new matter is contained in the amendments.

A. Rejections Under 35 U.S.C. §102(b)/103(a) Combining Japan '299 with Cayle et al.

Claims 21-25, 27-34, and 36-39 were rejected under 35 U.S.C. §102(b)/103(a) as obvious in light of Japan '299 and Cayle et al. Applicants have amended Claims 21 and 31 to include, as suggested by the Examiner, “a pH range of about 3 to less than 8” Such an amendment relieves the present application from any overlap with the teachings of Japan '299. Applicants traverse the remainder of the rejection as follows.

The Examiner cites Cayle et al. as teaching “cellulase enzymes from *Trichoderma viride* [as] known to aid in disintegration of waste paper including newsprint.” (Office Action p. 3, lines 4-6). As noted in the Office Action, this reference does not disclose or suggest de-inking, i.e., detachment or removal of ink particles from the pulp, as presently claimed. The reference only teaches disintegration of the fibers, and not ink detachment or removal of ink particles, which are critical steps in de-inking. With many inks on wastepaper, such as toner-based inks, it is possible to dissociate the paper fibers without detaching the ink. Hence it is not an aid in de-inking to simply disintegrate the fibers since key ink removal stages, such as flotation, require a separation of ink and fiber. Further underscoring the differences between detachment of ink from paper fibers and disintegration of the paper fibers is the fact that disintegrated fibers as taught by Cayle et al. may deleteriously result in smaller fibers causing slower manufacturing speeds, reduced production yield, reduced product strength and increased coarseness of the final paper product.

Applicants emphasize that Japan '299 teaches only enzymatic deinking in an alkaline environment. Applicants' invention is a novel and unobvious improvement on the art as it

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existed in 1989, as the invention discloses for the first time that enzymatic deinking can be performed in a neutral medium. As described in the parent application, United States Patent Application Serial No. 07//518,935, neutral deinking occurs in the pH range of 3 to 8.

The Examiner further states that it would have been *prima facia* obvious to one of ordinary skill in the art to use the Japan '299 reference with the enzymes of Cayle et al. to achieve enzymatic deinking at a neutral pH. Applicant respectfully traverses this rejection by providing for the Examiner's review several pieces of evidence to rebut the rejection based on §102(b)/103(a). First, Applicants provide the Declaration of Dr. Karl-Erik Eriksson who possesses a Dr. Sci. degree in the field of biochemistry and has conducted extensive research in the fields of enzymology, microbiology, and biochemistry. Second, Applicants provide an industry newsletter from October of 1993. That independent publication, found in Paper and Pulp International (PPI), was entitled "Neutral Deinking Makes its Debut" and touted the breakthrough of this technology. Finally, Applicants provide the Declaration of Dr. Douglas Eveleigh who is an expert in the areas of enzymology and biochemistry.

As stated above, Applicants submit herewith as Exhibit A the Declaration of Dr. Karl-Erik Eriksson in accordance with 37 C.F.R. §1.132. Dr. Eriksson has a Dr. Sci. degree in biochemistry and was at the time of his declaration a Professor of Biochemistry and Eminent Scholar at the University of Georgia, in Athens, GA. It is the opinion of Dr. Eriksson that the Japan '299 patent, read in its entirety, merely teaches one of ordinary skill in the art the successful use of alkaline deinking with enzymes. Dr. Eriksson believes that despite the overly broad and unsupported statement made in Japan '299 that the deinking enzyme could retain its activity in the alkaline range as well as the acid or neutral range, that as of the priority date of May 16, 1989 combining that disclosure with the knowledge possessed by one of ordinary skill of the art would not generate an expectation for the successful use of enzymes for removing ink from pulp in a non-alkali environment in particular in a pH range of between 3 to about 8.

Dr. Eriksson buttresses his conclusion on a thorough analysis of the Japan '299 specification. Specifically, Dr. Eriksson focuses on the language in Japan '299 dealing with the enzymes retaining activity in alkaline or acidic pH ranges as a product of cellulase culture liquid

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origination from salting out, precipitation, dialysis, and gel fractionation. (Japan '299, page 3, lines 1-5). Dr. Eriksson notes that this refers to the conditions for purification of the enzymes and does not suggest using the enzymes for deinking under acidic or neutral pH ranges. Moreover, before the advent of the present invention deinking was believed to require alkaline conditions to facilitate the enzymatic component of that process. If enzymatic deinking were performed in the absence of alkaline conditions, one of ordinary skill in the art would not have expected fiber swelling to occur. Therefore, it is Dr. Eriksson's expert opinion that neutral condition enzymatic deinking, in particular at a pH of between 3 to about 8, was neither taught, disclosed, nor suggested in the Japan '299 to one of skill in the art at the time of priority.

In the deinking art there are over twenty years of published detailed studies from commercial, academic, and government laboratories that emphasize that chemical modification and treatment by alkali exposure is necessary for deinking. As a recent example, Applicants have provided the PPI article mentioned above as Exhibit B. The article explains how the first neutral deinking system began its operation in July of 1992, more than three years after the priority date of the present invention. The article further describes how the addition of alkalis such as sodium hydroxide to the pulp prior to or during deinking was standard and, at that time, thought to be required. Not only does this article buttress the Applicants' position that neutral deinking would not have been obvious at the time of invention, but it also serves as an objective indicia of nonobviousness, thus overcoming the *prima facia* case of obviousness altogether.

A *prima facia* case of obviousness can be rebutted by objective indicia of the lack of such obviousness. *See Graham v. John Deere Co.*, 383 U.S. 1 (1966). The Federal Circuit has expounded on the objective indicia of nonobviousness and held acclaim by others in the field of the invention's success to be such an objective indicia of nonobviousness. *See In re Dow Chem. Co. v. American Cyanamid Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988); *Burlington Indus., Inc. v. Quigg*, 822 F.2d 1581, 1584 (Fed. Cir. 1987). An article in a trade publication at least three years after the present invention which states very plainly that neutral pH deinking is new should be considered strong and convincing evidence to support Applicants' assertion that the present claims would not have been obvious to one of ordinary skill in the art as stated by the Examiner.

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Finally, Applicants provide for the Examiner's review the Declaration of Dr. Douglas Eveleigh in accordance with 37 C.F.R. § 1.132 as Exhibit C. It is Dr. Eveleigh's opinion that Japan '299 does not provide to those skilled in the art an expectation for the successful use of enzymes for removing ink from pulp in a non-alkali environment, despite the broad and unsupported statement that "any cellulase without restriction" may be used. (Office Action, p. 3, line 8). It is Dr. Eveleigh's opinion that this is true because Japan '299 only provides actual data for embodiments of deinking newspapers in alkaline conditions in Examples 1-3. The emphasis on an alkaline condition for deinking is epitomized in Japan '299 when the only cellulase described with sufficient detail to practice is "[a]lkaline cellulase . . . having optimum pH 8.0-11.5 (preferably 8.1-11.0). (Japan '299, p. 2, last line).

Prior to the description in the above-identified patent application, it was believed that alkaline conditions were necessary for deinking with enzymes in order to cause ink containing paper fibers to swell, which effect defiberization, ink detachment, and deinking. Absent alkaline conditions, one would not have expected swelling, and therefore adequate ink detachment and removal, to occur as a result of the addition of deinking enzymes alone in the pulping process. Therefore, to one skilled in the art of deinking at the time the priority application was filed in 1989, the deinking action of enzymes in a non-alkaline environment would have been extremely novel and surprising. It is Dr. Eveleigh's opinion that an expectation of successful use of deinking enzymes in an aqueous environment having a pH of less than 8 is not found in the '299 patent.

Therefore, based on the remarks herein and in Exhibits A-C, Applicants respectfully ask that the Examiner allow the pending claims without delay as Applicants have clearly rebutted the statements in the Office Action based on Japan '290 and Cayle et al.

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B. Rejections Under 35 U.S.C. §102(b)/103(a) Combining GB 2,231,595 with Cayle et al.

Claims 26, 27, 35 and 37 have been rejected in light of GB 2,231,595 ("GB '595") issued to Ow et al. and filed December 29, 1989, and if necessary, combining that reference with Cayle et al. Applicants respectfully traverse this rejection considering that the co-owned GB '595 is the "equivalent" of the 1989 Korean application to which the present application claims priority. (See Office Action, p. 4, ¶ 2). The teachings of GB '595, in fact, are covered by the 1989 Korean application, and are thus Applicants' own teachings to which priority is claimed.

The Applicants respectfully request that the Examiner lift these rejections and issue the pending claims in light of the foregoing.

C. Obviousness-Type Double Patenting Rejection

Claims 21-39 have been rejected under the judicially created doctrine of obviousness-type double patenting over the claims in the issued U.S. Patent No. 5,785,809. Applicants file herewith a Terminal Disclaimer limiting the term of the present application once issued to no longer than the term of the already issued patent. The Examiner is encouraged to call the undersigned attorney at 404-853-8081 if doing so will facilitate prosecution of the application. No additional fees are believed due, however, the Commissioner is hereby authorized to charge any fees due or credit any overpayment to Deposit Account 19-5029.

Respectfully submitted,

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